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Internal-wave radiation by a horizontally oscillating body in a uniformly stratified fluid

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In this experimental-theoretical study we consider the waves emitted by a horizontally oscillating sphere in a linearly stratified fluid. In contrast to former investigations, the thus generated wave pattern is a-symmetric and three-dimensional. We consider large and small amplitude horizontal oscillations for different size spheres. The spatial structure of internal waves has a non-trivial dependence on the body geometry, direction and frequency of oscillations. The flowfield is measured quantitatively, using an alternative version of the synthetic schlieren technique. In addition we exploit the technique to visualise internal waves with fluorescein dye planes used by Hopfinger et al (Exp. in Fluids, 11, 1991) to measure the displacement field of the internal waves. For the theory a uniformly stratified viscous Boussinesq fluid of infinite extent is considered, with small viscosity and the boundary layer on the body surface neglected. For small amplitude oscillations, the comparison with the theory is good, with the near- field theory being in very good agreement with the experimental results and the far field theory slightly overestimating the wave amplitude.